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Some ants (Hymenoptera: Formicidae) from Southern Vancouver Island, British Columbia

N.C. BLACKER

C/O BIOLOGY DEPARTMENT, UNIVERSITY OF VICTORIA,
VICTORIA, B.C., V8W 2Y2

ABSTRACT

A study of the ants collected in and around Victoria and on Thetis Island during the Autumn of 1987 and the Spring of 1988 is described. Twenty-four species were found, and the locations and habitats have been noted. Two of the *Leptothorax* species are believed to be new records for Canada and another remains unidentified. Some myrmecophiles were also recorded.

INTRODUCTION

Little has been published on the ant fauna of British Columbia. According to Buckell (1932), Muesebeck (1951), and Ayre (in Sharplin, 1966), between 45 and 55 species, subspecies and varieties have been recorded, although the taxonomic status of some is uncertain. The Victoria region, at the southern tip of Vancouver Island, has an equable climate, and this, combined with a considerable diversity of habitats, would be expected to make an investigation of its ant fauna worthwhile.

The west coast of British Columbia is well known for its heavy rainfall. The highlands west of Victoria receive about 54″ (137 cm) of rain annually, but Victoria itself is in their rain shadow and so receives only half of this amount, most of which falls during the winter. As a result, Victoria has the lowest midsummer rainfall in Canada (Kerr, 1951), and drought often withers the vegetation, even though temperatures are not particularly high. This is significant as ants are influenced by soil surface temperatures rather than the overall meteorological climate. Thus, summer sunshine is very important and mild winter weather is largely irrelevant.

The rainfall gradient also increases habitat diversity by creating a series of vegetation zones, the effect being amplified by variations in relief. Several ecological classifications have been proposed (Hagmeier, 1965; Roemer, 1972; McMinn, 1976; and Pavlick, 1986). The major vegetation types listed in order of increasing moisture are:

(A) Grass balds/Garry oak woodland. This consists of rock outcrops with grass and mosses and scattered oaks (*Quercus garryana*).

(B) Douglas fir forest. Douglas fir (*Pseudotsuga menziesii*) often with scattered *Arbutus menziesii* and an understory of mosses and, in moister sites, Oregon grape (*Berberis* spp.).

(C) Western red cedar forest. Dense stands of cedar (*Thuja plicata*) often with western swordfern (*Polystichum munitum*) beneath.

(D) Coastal western hemlock forest (*Tsuga heterophylla*). Absent from the immediate Victoria area.

There is also a number of types which are either of localised occurrence or are due to human activities:

(E) Wet deciduous forests

(F) Meadows (dry and wet)

(G) Bogs

(H) Beaches, sand dunes

(I) Urban and suburban.

M

Table 1
Ants of Southern Vancouver Island

	Species	Locality x	a	b	c	d	e	f	g	h	i	j	k	l
(1)	*Myrmica emeryana* group sp.						■	s	■		s			
(2)	*M. incompleta*			■	s		s	■		■				
(3)	*Stenamma diecki*		■					s				s		
(4)	*Aphaenogaster subterranea occidentalis*	■	s		■	■		s	■			■		
(5)	*Solenopsis molesta*	■												
(6)	*Leptothorax muscorum*		s		■									
(7)	*L. muscorum* group sp. "*uvicensis*"				■									
(8)	*L. rugatulus*		■			■			■					
(9)	*L. melanderi* (?)	■	■			■								
(10)	*L. nevadensis* (?)								■					
(11)	*Tapinoma sessile*		■			■		■						
(12)	*Brachymyrmex depilis*					■								
(13)	*Lasius pallitarsis*	■	■		s	s		s	■			s		
(14)	*L. alienus*	■				s		■			s	s		
(15)	*Camponotus modoc*	■		s	■			s			s			
(16)	*C. laevigatus*	■												
(17)	*C. vicinus*	■				■		■						
(18)	*Formica subnuda*				s	■			s		s			
(19)	*F. obscuripes*			■	s	s								
(20)	*F. accreta*	■	■		s	■	s	■	■	s	s	s	s	s
(20a)	*F.* sp. "*fuliginothorax*"		■		■		s	■	s					■
(21)	*F. pacifica*						s				s		■	■
(22)	*F. neorufibarbis*				■									
(23)	*F. subpolita*													■
(24)	*F. lasioides*		■		■	■			■		s			■
	Site Total n =	9	10	3	12	12	5	11	9	2	7	5	2	5

	Locality	Habitat type (see text)
x	Pilkey Pt area (Thetis Is.)	B
a	Mt Douglas	A, B, C
b	Blenkinsop Rd and Lake	F
c	UVic Campus	A, C, F, I
d	Mt Tolmie	A
e	Cedar Hill Crossroads	I
f	Cadboro Pt Peninsula	B, I
g	Uplands Park	A
h	Oak Bay	H, I
i	Shelbourne St	I
j	Pembroke St	I
k	Stanley Ave area	I
l	Coast, Clover Pt westwards	F

■ Specimen taken
s Sight Record

MATERIALS AND METHODS

Specimens were collected by hand and preserved in 25% isopropyl alcohol containing traces of copper sulphate. 70% ethyl alcohol can also be used. Foraging workers were mostly taken from the soil surface and from tree trunks. Nests were located under stones and in or under fallen logs and tree stumps. No excavations were carried out, so highly subterranean species and those that nest only in the soil are likely to be under-represented in, or absent from, the collection.

RESULTS AND DISCUSSION

The results are based on collections made in September/October 1987 and May 1988, and are summarised in Table 1. The collection sites mentioned are shown on Figures 1a and 1b. The survey was not comprehensive—only habitats of six types were investigated—so there is enormous scope for future work.

Twenty-four definite species were found, several on a single occasion only. The *Formicinae* is the dominant subfamily with 13 species, followed by the *Myrmicinae* with 10 species and a single member of the *Dolichoderinae* (Table 2).

A number of the identifications are tentative because the taxonomy of many groups of North American ants is uncertain, and synonyms exist for many species. Because of this, all *Myrmica* and *Leptothorax* species are illustrated and the latter are also briefly described.

Subfamily *Myrmicinae*

A large subfamily, the members are characterised by a sting and a two-segmented petiolus. Pupae are never enclosed in cocoons. Tropical genera display a great diversity of form, but the species listed here are all rather conservative in appearance and behaviour, being well armoured and slow moving. Body surfaces are usually sculptured except for the gaster. Only *Myrmica* (with two species) and *Leptothorax* (with five) were represented by more than one species. This is a surprisingly small number in the former case. Two of the *Leptothorax, L. melanderi* and *L. nevadensis*, are believed to be new records for Canada and another has not been identified. Additional species could occur.

(1) *Myrmica emeryana* group sp. (Fig. 2a)

A typical *Myrmica* species, length 4-4.5 mm with foreparts reddish-brown, gaster slightly darker. Head and thorax coarsely rugose. Antennal scapes sharply angled near base. Widespread rather than abundant in short turf. Both this and the next species were more in evidence in May 1988 than in the hot, dry autumn of 1987. A small alate female of about 5 mm was taken in mid-September 1987 near Uplands Park. It is assumed to be of this species although the ventral surface of the petiole is not obviously convex.

(2) *Myrmica incompleta* Provancher (Fig. 2b)

Slightly larger than the previous species (about 4.5 mm) with both head and gaster normally dark. Head and thorax with coarse sulcations. Antennal scapes evenly curved from base. It was first taken on the beach at Oak Bay, otherwise its occurrence was similar to that of the previous species, but with some preference for damper, more thickly vegetated sites. *Myrmica* colonies typically contain 500-1500 workers.

(3) *Stenamma diecki* Emery

The workers of this species are small (3.5 mm), slender and dark reddish-brown. When foraging they are slow moving and inconspicuous. Colonies contain approximately 100 workers and typically occur under stones in shaded sites. Careful searching in red cedar forest usually reveals one or two. Alates were present in the nests in September and October 1987.

(4) *Aphaenogaster subterranea occidentalis* Emery

Workers of this common species may initially be mistaken for *Myrmica* but are more slender and shiny—somewhat similar in shape to *Stenamma*, although larger. They are most often seen above ground in the evening. Colonies are found under large stones in Garry oak woodland, Douglas fir forest, and gardens. They are similar in size to those of *Myrmica* species (4-5 mm).

(5) *Solenopsis molesta* Say

This tiny (1.5 mm) yellow, thief ant was taken only once. About 20 workers and pupae were found under a small stone in a shaded area of Douglas fir forest on Thetis Island, a few feet from a *Lasius alienus* colony. It is probably widespread, but is easily overlooked due to its subterranean habits. Mature *Solenopsis* colonies can be very populous.

Table 2
Relative abundance of the ant fauna in the vicinity of Victoria, B.C. by habitat type

	Habitat Types					
	A	B	C	F	H	I
(1) *Myrmica emeryana* group sp.				C		C
(2) *M. incompleta*				C	C	C
(3) *Stenamma diecki*		?	S			S
(4) *Aphaenogaster subterranea occidentalis*	V	V				C
(5) *Solenopsis molesta*		S				
(6) *Leptothorax muscorum*		?				S
(7) *L. muscorum* group sp. "*uvicensis*"						S
(8) *L. rugatulus*	C					
(9) *L. melanderi* (?)	S	C	S			
(10) *L. nevadensis* (?)	S					
(11) *Tapinoma sessile*	S	S				
(12) *Brachymyrmex depilis*	S					
(13) *Lasius pallitarsis*	V	V	V	?		V
(14) *L. alienus*		C				S
(15) *Camponotus modoc*		S				C
(16) *C. laevigatus*		S				
(17) *C. vicinus*	S	C				
(18) *Formica subnuda*	C					C
(19) *F. obscuripes*	S			S		
(20) *F. accreta*	V	V	S	?	V	V
(20a) *F.* sp. "*fuliginothorax*"	S					S
(21) *F. pacifica*						C
(22) *F. neorufibarbis*						S
(23) *F. subpolita*				S		
(24) *F. lasioides*	V			V		V
	13	10	4	5	2	15

Habitat Types A–I (see text)

V = Very common or locally abundant
C = Fairly or locally common
S = Scarce to very rare
? = Status uncertain

(6) *Leptothorax muscorum* (Nylander) (Fig. 2c)

Workers of this species resemble a small (3.5 mm) short legged *Myrmica*, reddish-brown with head and gaster darker. Female castes of this and the next two species have 11-segmented antennae. Clypeus with slight but distinct trough. Mesopropodeal suture distinct from above. Tibiae and scapes may have some sub-erect hairs, looped on the latter. Antennal clubs dark. Funiculus segments 2-6 only marginally longer than broad. Coarse sculpture defining a deep, rounded well for antennal insertions. Gaster slightly convex at junction with postpetiole. *Leptothorax* colonies are usually small, with 50-200 workers. Several were found in stumps in the University Gardens. Also seen on Mt. Douglas and perhaps also on Mt. Tolmie, but no specimens were taken at these sites.

Note—The European *L. muscorum* has not been recorded east of the Urals (Collingwood, 1979). If the North American species is truly identical this presents an interesting biogeographical puzzle.

(7) *Leptothorax muscorum* group sp. "*uvicensis*" (Fig 2d)

This species is blackish in colour and less strongly sculptured than the previous species. Clypeal trough indistinct. Mesopropodeal suture less distinct from above. Antennal well also less sharply defined and more oval in shape. The thorax of this species is slightly flatter and more slender in profile than the previous species, but broader in dorsal view. Dorsal surface of petiole rises to a distinctive peak. A single colony was found nesting in a stump in the University Gardens, very close to, but completely separate from, a *L. muscorum* colony. It is possible that *L.m.* "*uvicensis*" is an extreme variant of *L. muscorum*, but the differences are sufficient for it to be tentatively regarded as distinct, allied to species such as *L. wilsoni* and *L. crassipilis*. More specimens, including alates, are needed.

(8) *Leptothorax rugatulus* Emery (Fig. 2e)

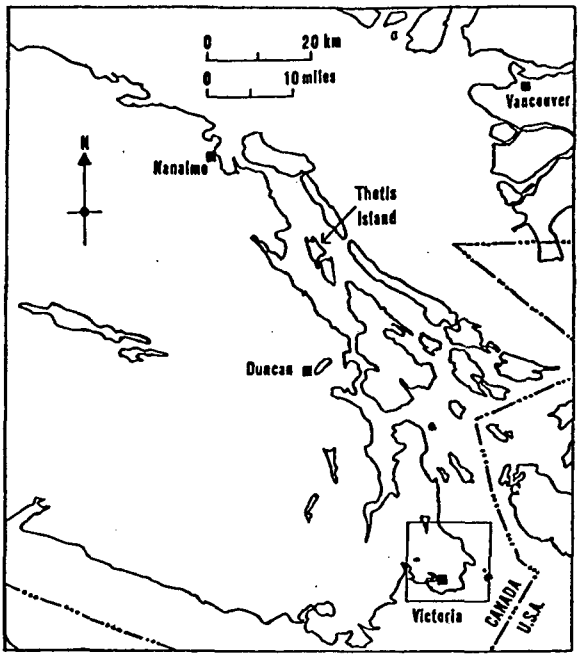
Despite having 11-segmented antennae *L. rugatulus* is quite distinct from the previous two species and more like the following two in general appearance. Workers are 2.5-3.0 mm long, reddish-brown, with head and gaster darker. It is solidly built, with a somewhat box-shaped thorax. Mesopropodeal suture indistinct. Propodeal spines of moderate length and divergent. Appendage hairs mostly sub-erect or decumbent. Antennal clubs pale. Funiculus segments 2-6 distinctly longer than broad. Gaster concave at junction with postpetiole, in contrast to the previous two species. This species nests under stones in dry, grassy sites.

(9) *Leptothorax melanderi* Wheeler (Fig 2f)

This is a yellowish-brown species, length about 2.5 mm. Antennae 12-segmented, clubs pale. First funiculus segment about as long as the next two. Head and thorax punctate reticulate. Propodeal spines characteristically upright. It is tentatively identified as *L. melanderi* after examination of species from Montana held in the British Museum (Natural History) in London. The Montana species are, however, larger and have relatively shorter propodeal spines than those described above. Similar species which could occur in the province include *L. ambiguus* (which has 11-segmented antennae) and *L. nitens*. This is the most widespread *Leptothorax* species, usually nesting under stones in mossy, semi-shaded sites. When the nest stone is lifted the workers often remain motionless for several seconds, then simultaneously start running about, presumably triggered by the release of an alarm pheromone.

(10) *Leptothorax nevadensis* Wheeler (Fig. 2g)

This species is blackish, length about 2.5 mm. Antennae 12-segmented with dark clubs. First funiculus segment distinctly longer than next two. Head and thorax more densely and evenly punctate reticulate than the previous species and propodeal spines flatter. The high, rounded petiole is distinctive. The specimen described here compares well with those in the British Museum collection although it is again slightly smaller in size. From the material examined it is difficult to understand why Creighton (1950) treats *L. melanderi* as a subspecies of *L. nevadensis*. They appear to be quite distinct, particularly if due weight is given to the morphology of the petiolus region, rather than to sculpture. A single worker was taken in Uplands Park. It was captured in late afternoon in a very dry, stony area with very short grass. To the author's knowledge, no *Leptothorax* with 12-segmented antennae have previously been recorded from British Columbia.

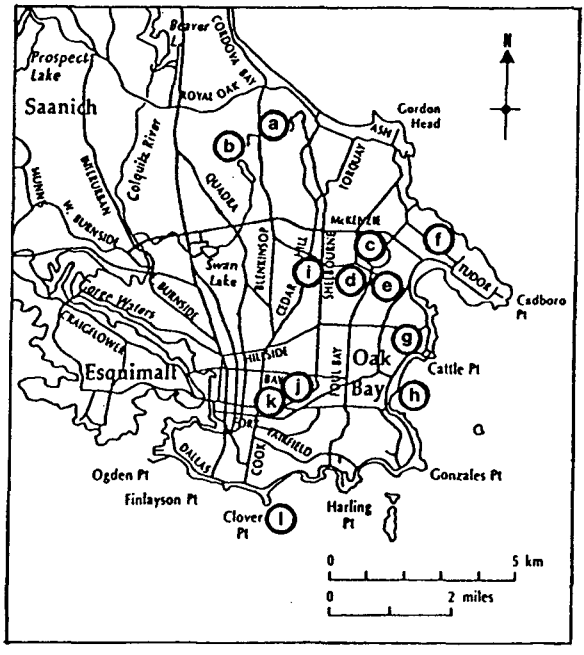


a

(After Tourism British Columbia, 1986, adapted.)

Figure 1a. Collection area, with Thetis Island indicated and Victoria region enclosed.

b



(After Weston, 1986, adapted.)

Figure 1b. Location of collection sites in the Victoria region.

Subfamily *Dolichoderinae*

Members of this subfamily are mostly monotonous in appearance. They are lightly amoured and have only a single petiole segment. The sting is vestigial or absent but the poison glands produce effective repellents. Pupae are naked. A single species was found.

(11) *Tapinoma sessile* Say

The workers of this species are small (2.5 mm), blackish and very agile. It is adaptable and can occur in a variety of habitats. It was taken at several scattered sites, a few hundred workers at most.

Subfamily *Formicinae*

Ants of this subfamily are similar to the *Dolichoderinae* in general appearance. The petiole consists of a single scale and the poison glands produce formic acid, which some genera, particularly *Formica*, can squirt a considerable distance. In many *Formica* species naked pupae are common while in other genera they are normally enclosed in cocoons. *Formica* is the dominant genus with seven definite species. Three *Camponotus*, two *Lasius* and one *Brachymyrmex* species were also recorded.

(12) *Brachymyrmex depilis* Emery

This minute (c 1.5 mm), pale brown species was taken once on Mt. Tolmie under a small piece of wood and an adjacent stone. It may be quite widespread, but like *Solenopsis molesta* it is easily overlooked because of its small size and subterranean habits.

(13) *Lasius pallitarsis* Provancher (syn. *L. sitkaensis* Pergande)

A relatively robust species. Workers are about 3.5 mm long and pale brown in colour. It is widespread, and most often found under stones in semi-shaded or shaded habitats. Workers sometimes forage above ground and even up small trees. Alates were seen in September.

(14) *Lasius alienus* Förster

This small (2.5-3.0 mm), brown species was found two or three times in partially shaded situations. It is probably widespread. Its behaviour in North America contrasts with that in Western Europe where it favours an open heathland habitat. Mature *Lasius* colonies are usually populous, with several thousand workers.

(15) *Camponotus modoc* Wheeler

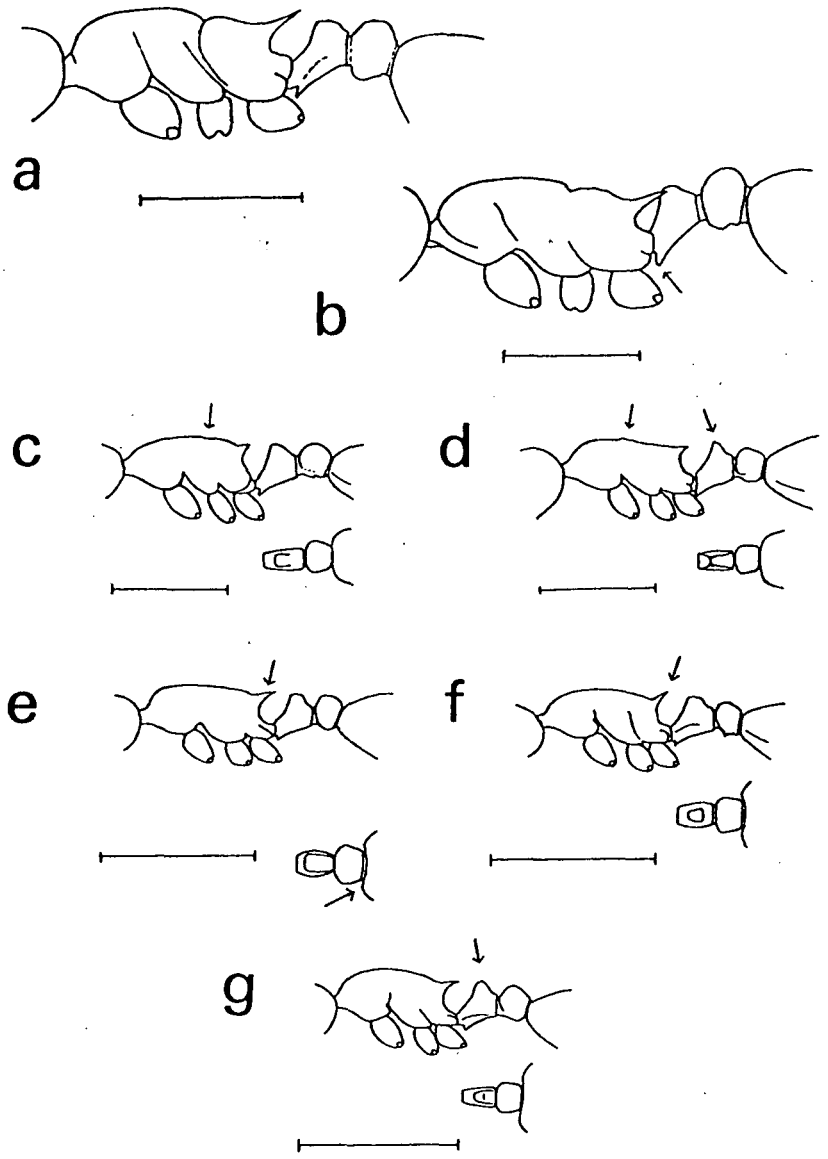
The western equivalent of the carpenter ant, *C.* pennyslvanicus. Workers are up to 13 mm long, and dull black with reddish legs. It is probably the commonest *Camponotus* species in Victoria itself, sometimes occuring in gardens. It is uncommon by the roadside in the Pilkey Point area of Thetis Island. Nests are usually situated in or under wood. They are fairly populous, estimated to contain from several hundred to over a thousand workers. Workers were often observed climbing trees, probably to tend aphids. On 11th May, 1988, a nuptial flight took place on the University of Victoria campus. Most colonies released only a few dozen alates, but one produced at least 1000 (quite possibly more than that number), an impressive sight as they covered at least 20 square yards of vegetation in their attempts to get airborne.

(16) *Camponotus laevigatus* F. Smith

The workers of this shining black species are smaller, faster and more agile than those of *C. modoc*. Two or three colonies of moderate size were found in clearings in Douglas fir forest on Thetis Island. The nests occur in fallen logs.

(17) *Camponotus vicinus* Mayr

Another very large species, the workers display a more marked polymorphism than those of *C. modoc*. They are normally bicolored, the red thorax contrasting with the dark head and dull black gaster, but the workers of a small colony from a shaded site on Thetis Island were entirely dark. As these were otherwise not separable from other specimens they are likely to belong to this species. Nests are normally located beneath logs or stones and are of moderate size. It was common in Douglas fir forest on Thetis Island but the colony found on Mt. Tolmie was well away from trees. It appears to be largely nocturnal which makes it much less conspicuous than *C. modoc*. Alates were present in Thetis Island nests in early September, and these possibly over-winter and fly in early summer.



Figures 2a-b. Alitrunk in profile of workers of *Myrmica*.
Figure 2a. *Myrmica emeryana* group sp.
Figure 2b. *Myrmica incompleta*.
Figures 2c-g. Alitrunk in profile and dorsal view of petiolus of workers of *Leptothorax*.
Figure 2c. *Leptothorax muscorum*
Figure 2d. *Leptothorax muscorum* group sp. "*uvicensis*"
Figure 2e. *Leptothorax rugatulus*
Figure 2f. *Leptothorax melanderi* (?)
Figure 2g. *Leptothorax nevadensis* (?)
Scale: 1 mm; arrows = important diagnostic characters.

Note—Two other very large *Camponotus* species could potentially occur in the Victoria region. *C. herculeanus* and *C. noveboracensis* are closely allied to *C. modoc*, all worker castes sharing the very robust form of that species, but being bicolored they are more likely to be confused with *C. vicinus*. *C. herculeanus* tends to be the darker of the two. It has a pubescent gaster, like *C. vicinus*. *C. noveboracensis* usually resembles typical *C. vicinus* in having a brighter red thorax but with a shining gaster.

(18) *Formica subnuda* Emery

A conspicuous species, typically 6-8 mm long with head and thorax blood-red, gaster black. Like most members of the *F. sanguinea* species group it is a facultative slave raider. *F. accreta* and *F. neorufibarbis* slaves were seen, and these occasionally accompanied the *F. subnuda* workers up trees to tend aphids. One colony had slaves of both species. It is fairly common in suburban areas and Garry oak woodland, usually nesting in sunny situations in stumps or under stones. Most colonies contained at least a few hundred workers.

(19) *Formica obscuripes* Forel

The only member of the *F. rufa* group seen. Workers are quite large, about 5-8 mm. Majors have orange heads, but minors are darker, being almost a uniform blackish-brown. It is very sparsely distributed in Victoria itself, building typical "wood ant" heaps of vegetable debris in grassy areas around woodland borders. These contain tens of thousands of workers.

(20) *Formica accreta* Francoeur

A fairly large (4-7 mm) black species, it is very like the European *F. fusca* but more aggressive. Colonies of this and all the following species vary in size from several hundred to a thousand or more workers. It is easily the most conspicuous ant in Victoria, being abundant and almost universally distributed. The type locality is Royal Oak, a suburb of Victoria. Several de-alate females were seen wandering over the ground in early September. A pterergate was also collected.

(20a) *Formica* sp. "*fuliginothorax*"

This "species" may be synonymous with *F. accreta* as the only clear distinction is the dark brown colour of *F.* "*fuliginothorax*". Francoeur (1973) describes *F. accreta* as being black or dark brown. *F.* "*fuliginothorax*" was not, however, seen to associate with *F. accreta* and no mixed colonies were found. It is much more sparsely distributed and seems to favour different habitats—normally short turf or crumbling banks. More specimens are needed, including alates.

(21) *Formica pacifica* Francoeur

A distinctly coloured species, with fine but dense bronze pubescence on the thorax and a darker head and gaster. It has an interesting distribution, being almost entirely restricted to urban areas. Nests normally occur between cracks in concrete, so it is commonest by roadsides and in car parks. The only record from an even semi-natural habitat was at Clover Point.

(22) *Formica neorufibarbis* Emery

This species is characteristically bicolored, with a blackish head and gaster, and red thorax. Despite its robust build it is rather timid and it was taken only in the gardens of the University of Victoria, where a couple of nests were found in stumps.

(23) *Formica subpolita* Mayr

Another robust species. It is darker in colour than *F. neorufibarbis* and has a characteristically convex dorsal surface to the propodeum. Two workers were taken on short turf above the cliffs near Beacon Hill Park.

(24) *Formica lasioides* Emery

The only member of the *F. neogagates* species group to be found. It is rather variable in size, colour and pilosity but is always shining, with at least a few erect hairs on its antennal scapes. It is widespread in grassy habitats, including open oak woodland.

Myrmecophiles

The ant cricket, *Myrmecophila oregonensis* Bruner, was observed on several occasions near nests of *F. obscuripes* and *F. subnuda*. Two ant mimics were also found. A bug (*Nabis* sp.) was taken on Thetis Island, and an unidentified spider mimic of *F. subnuda* was seen on Mt. Tolmie.

CONCLUSIONS

This study attempts to relate the ant fauna to habitat type. While it is provisional due to the small number of sites visited and the influence of human perturbances, it should have some predictive value for a more comprehensive survey. Of the natural habitats, the grass balds—Garry oak woodland appears to have the richest fauna (13 species). This is not surprising because of the high insolation at the soil surface, but it should be noted that this habitat was by far the most intensively searched. South-facing clearings in Douglas fir forests are probably comparable. The cooler red cedar forest has a much more limited ant fauna but is notable for the presence of *Stenamma diecki*. Culivated and urban areas increase habitat diversity and are of interest because of the presence of a number of species recorded from truly "wild" areas, particularly *Formica pacifica*.

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